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COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods
(Thirteenth session,
Geneva, 7-17 July 1997,
agenda item (5 (b))

GLOBAL HARMONIZATION OF SYSTEMS OF CLASSIFICATION AND LABELLING OF CHEMICALS

Physical hazards

Ammonium Nitrate and Ammonium Nitrate Fertilizers

Transmitted by the European Fertilizer Manufacturers' Association (EFMA)

Introduction

1 The Working Group on Reactive Substances had brief discussions on the classification of ammonium nitrate (AN) and ammonium nitrate based groups of substances at the time of the nineteenth session of the Committee. Following discussion on the proposals made by the expert from Germany (ST/SG/AC.10/C.3/R.749), there was general acceptance that these groups of substances represented a special case and that further discussion would be needed. The expert from EFMA offered to submit new proposals; they are presented in this document.

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2 Current Classification

Ammonium nitrate is an important component for the explosives industry, but by itself it is too insensitive to be used and classified as an explosive. It is also an important fertilizer being a source of nutrient nitrogen and is widely used in the production of a wide range of fertilizers. Thus various products based on AN fall into the following three classes, as detailed in Table 1.

Class 1:	AN with added combustible substance
Class 5.1:	Pure AN and AN-based fertilizers
Class 9:	AN-based compound fertilizer with potential toxic gas release hazard.

In addition to the above, "ammonium nitrate explosive", Class 1.1D and 1.5D is covered by UN Nos 0082 and 0331 (Blasting Explosive, Type B).

The German document, ST/SG/AC.10/C.3/R.749 gives a good historical background to the above classification, which was on the basis of an evaluation by experts from the leading industrial nations. Most of the AN and related entries are described in composition terms. There was, and still is a good justification for this. Most of the products described are mixtures and not pure substances. Depending on the agronomic needs of crops, fertilizer mixtures may need to have a range of compositions to provide various levels of nutrients. Many different fertilizer formulations are produced at short notice by the industry to meet farmers' specific needs. Therefore, classification systems strictly based on test methods would not be practical. A composition based system, as exists currently, is essential for the fertilizer industry.

Therefore, EFMA. supports the main element of the German proposal viz that the ***existing*** list provides a sensible way forward.

3 Review of the Existing Entries

Ammonium nitrate fertilizer, fitting the definition of UN No 0223 relates to the wax-coated form of AN fertilizer which was involved in the Texas City disaster in 1947. As far as EFMA is aware, such products have not been produced for many years and are unlikely to be produced in the future. This entry, therefore, may not be required.

UN No 1942 applies to "pure" AN such as technical/crystalline grade or low density prilled material used for making ANFO for blasting purposes. UN Nos 2067-2071 cover the range of AN based fertilizers normally required. Hot AN solution is adequately covered by UN No 2426. Therefore, these numbers along with No 2072 for NOS need to be continued.

4 Detonation Test

In the EC a detonation test based on a 4 inch steel tube is an optional criterion in defining EC AN fertilizer (within the terms of the EC Directive 80/876/EEC). It is applicable only to straight AN fertilizer containing more than 80% AN. The German paper appears to propose its application to a substantially wider range of AN fertilizers (Nos 2067-2070) on a global basis.

The implications are that for UN No 2067 type fertilizers it would apply at the bottom limit of 70% AN and for NPK fertilizers and AN/ammonium sulphate mixtures, it would apply if AN content exceeds 45%.

The addition of a further detonation test more onerous than the existing UN test (Series 2) is not justified in view of the excellent safety record of the AN industry over the past 40-50 years. Accidents over this period have shown fire to be the most common hazard. The current classification into Classes 5.1 and 9 are therefore most appropriate.

The EC detonation test includes a thermal cycling requirement. The justification for applying this test procedure to a large variety of products on a world-wide basis is questionable. The effect of natural thermal cycling depends on a range of factors such as the nature and composition of material, form of handling, climatic conditions etc.

5 Consideration of Risks

Every year millions of tonnes of prilled AN and AN fertilizers are produced, transported and stored around the world. Farming practices vary and in some regions large farms, well away from centres of population, predominate or farmers use contractors to apply their fertilizers and there is little or no on-farm fertilizer storage. Neither of these types of operation pose a significant risk to the general population. On the other hand, in some regions, many farms storing their own fertilizers are closely integrated with the population. Thus, storage and handling practices are clearly dependent on the nature of local agriculture and the relevant risks associated with the AN fertilizers differ. It follows that the requirements for safety and security may vary regionally, in which case legislative controls on storage etc should also be regional in nature. This may be by way of major hazard legislation or specific fertilizer regulations. The classification system should not be used for this purpose.

6 Conclusions and Proposals

1 The Ammonium nitrate and ammonium nitrate fertilizer group of substances represent a special case. Many of them are mixtures (as opposed to pure substances). Their classification should continue to be according to the existing UN numbers and Classes/Divisions.

2 UN No 0223 for ammonium nitrate fertilizer does not appear to be in use and therefore the benefits of its continued listing deserve examination by the Committee of Experts on the Transport of Dangerous Goods.

3 An additional detonation test such as the EC 4 inch steel tube test should ***not*** be introduced in the global harmonisation scheme. Where the need for such additional safeguards is perceived, appropriate national or regional controls can be introduced via fertilizer and/or safety legislation.

TABLE 1

Assignment of Ammonium Nitrate and Fertilizers containing Ammonium Nitrate to Classes and Numbers of the UN system

Class	UN Number	Name and Description
1	0222	ammonium nitrate with more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance
1	0223	ammonium nitrate fertilizer, which is more liable to explode than ammonium nitrate with 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance
5.1	1942	ammonium nitrate with not more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance
5.1	2067	amonium nitrate fertilizers: uniform non-segregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, with not less than 90% ammonium nitrate and not more than 0.2% combustible material (including organic material calculated as carbon), or with more than 70% but less than 90% ammonium nitrate and not more than 0.4% total combustible material
5.1	2068	amonium nitrate fertilizers: uniform non-segregating mixtures of ammonium nitrate with calcium carbonate and/or dolomite, with more than 80% but less than 90% ammonium nitrate and not more than 0.4% total combustible material
5.1	2069	Ammonium nitrate fertilizers: uniform non-segregating mixtures of ammonium nitrate/ammonium sulphate, with more than 45% but not more than 70% ammonium nitrate and not more than 0.4% total combustible material
5.1	2070	Ammonium nitrate fertilizers: uniform non-segregating mixtures of nitrogen/phosphate or nitrogen/potash types or complete fertilizers of nitrogen/phosphate/potash type, with more than 70% but less than 90% ammonium nitrate and not more than 0.4% total combustible material
5.1	2072	ammonium nitrate fertilizer, NOS
5.1	2426	ammonium nitrate, liquid (hot concentrated solution)
9	2071	Ammonium nitrate fertilizers: uniform non-segregating mixtures of nitrogen/phosphate or nitrogen/potash types or complete fertilizers of nitrogen/phosphate/potash type, with not more than 70% ammonium nitrate and not more than 0.4% total added combustible material, or with not more than 45% ammonium nitrate with unrestricted combustible material

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COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods
(Thirteenth session, Geneva, 7-17 July 1997, agenda item (3 (b))

DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Use of packagings and IBCs

Packaging for safety matches

Transmitted by the Observer of South Africa

A new packaging has been developed for Matches, Safety, UN 1944, Class 4.1, Packing Group III.

There are two main packing configurations

a) **half packs** - maximum gross mass 9 kg. Made up of 100 packets of 10 x solid fibreboard boxes of matches. Each packet is wrapped in 52 g/m^2 machine-glazed paper manufactured from recycled material.

b) **full packs** - maximum gross mass 17 kg. Made up of

1) 200 packets of 10 x solid fibreboard boxes of matches. Each packet is wrapped in 52 g/m^2 machine-glazed paper manufactured from recycled material, or

2) 20 shrink-wrapped packs of 10 packets. Each packet contains 10 x solid fibreboard boxes of matches. The shrinkwrap film is 25 micron polypropylene and the pack is overwrapped in 52 g/m^2 machine-glazed paper manufactured from recycled material.

The construction of the outer packaging consists of a multi-walled paper sack incorporating two layers of 140 g/m^2 Kraft brown paper with the inner layer waterproof lined on the innermost side with a polyethylene coating. After filling, the open end is sealed with cold PVA adhesive. The style pack is a bale pack.

The South African Bureau of Standards, as the approved testing authority for the South African Department of Transport, performed the drop test and stacking test in accordance with the test methods given in the UN Recommendations on the packing configurations. Both these two packagings passed the tests (see annexes I and II for the test results).

PROPOSAL

We propose that the packaging be accepted for road, rail and sea transport of Matches, Safety; UN 1944, to a maximum gross mass of 20 kg.

South African Bureau of Standards
1 Dr Lategan Road, Groenkloof

Private Bag X191
PRETORIA 0001
Republic of South Africa

Your ref: Letter dd 94-09-26

Our ref: 17/22/47

Enquiries T.J. Grobler
☎ 428-6102

The Director
The Lion Match company Ltd
Attention: Mr J.R.G. Sessions
P.O. Box 918
Durban
4000

TEST REPORT

No. 691/83443/L400

Date 1994-11-25

This report relates only to the specific sample(s) tested as identified herein. It does not imply SABS approval of the quality and/or performance of item(s) in question and the test results do not apply to any similar item that has not been tested. (Refer also to the complete conditions printed on the back of the official test reports.)

1. DESCRIPTION OF PACKAGING DESIGN TYPE TESTED

See specification form attached as Appendix A.

Sample Numbers and Masses

Sample No.	Mass filled (kg)	Mass empty (kg)
1 2 3 4 5 6 7 8	8,7	-

Contents: Inner packagings, detailed in Appendix A, filled with matches

2. TESTS PERFORMED AND RESULTS

Test method: drop and stacking tests to paragraphs 9.7.3 and 9.7.6 of the Recommendations prepared by the United Nations Committee of Experts on the Transport of Dangerous Goods, as revised December 1990.

The methods of sample preparation and testing are detailed in the Operational Instructions for Test Stations, Appendices

Drop Test Results (paragraph 9.7.3)

Sample No.	Drop Ht(m)	Drop Attitude	Results
1	0,8	Flat on base	Pass
1	0,8	Flat on top	Pass
1	0,8	Flat on long side	Pass
1	0,8	Flat on short side	Pass
1	0,8	Diagonally on one corner	Pass

Annex I

Stacking Test Results (paragraph 9.7.6)

Sample numbers	: 1
Required load	: 8,7 kg per sample, equivalent to a 3m stack
Applied load	: 113 kg
Contents	: Actual commodity
Conditions	: 23 ± 2°C, 50 ± 2% r.h.
Results	: Pass

3. CONCLUSIONS

Samples of the packaging design type were tested in accordance with paragraphs 9.7.3 and 9.7.6 of the Recommendations prepared by the United Nations Committee of Experts on the Transport of Dangerous Goods, as revised December 1990.

They were tested for Group III, gross mass not exceeding 9 kg.

The samples passed the tests and the packaging design type is considered to meet the performance requirements.

NOTE:
This design type will only be allowed for National distribution and is subject to the approval of the regulatory authorities.

TJ Grobler
PACKAGING DIVISION
for PRESIDENT

This report relates only to the samples tested and is issued subject to the conditions printed on the back of Page 1. It does not imply approval by the South African Bureau of Standards of the quality and/or performance of the commodity that has been tested. It does not authorize the use of the Standardization Mark.

Hierdie verslag is van toepassing slegs op die getoetste monsters en word uitgereik behoudens die voorwaardes op die keersy van bladsy 1 gedruk. Dit beteken nie dat die Suid-Afrikaanse Buro vir Standaarde die kwaliteit en/of werkverrigting van die getoetste artikel goedgekeur nie. Dit verleen ook nie die reg om die Standaardmerk te gebruik nie.

SOUTH AFRICAN BUREAU OF STANDARDS

SABS SPP12 5/92

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

SPECIFICATION OF PACKAGING

PAPER BAGS (BALE PACK)

Appendix A L400

UN Code 5M1

Manufacturers Name & Address						
Style	Open mouth: Yes	Gusseted: N/A	Pasted/Seam: Yes			
	Valved: N/A	Non-gusseted: Yes				
Dimensions in millimetres	Length + A	Face width + B	Gusset o C	Bottom width + D	Valve width + E	
Nominal						
Actual including finish	565	410	-	-	-	

	Ply 1 (outer)	Ply 2	Ply 3	Ply 4	Ply 5	Ply 6	Liner
Type of material	K	PLC					
Grammage (g/m^2)	140	140					
Coating mass (g/m^2)	-	-					

Valve	N/A	
Closure	Base: Cold PVA adhesive (Rectangular closing method)	
	Top: Cold PVA adhesive (Rectangular closing method)	
Sewing	Type of stitch	Stitches per 100 mm
	Type of thread N/A	Min. breaking load (Newtons) N/A
	Filter cord	
Adhesive	Cold PVA adhesive	
Remarks	100 x paper wrapped unit packs of 10 x solid fibreboard boxes of matches, each unit pad wrapped in 52 per g/m^2 machine glazed paper of 100% recycled fibre. Packing pattern: 4 layers of 5 x 5 unit packs.	

ABBREVIATIONS

+	Flat unopened condition	Natural Kraft	K
o	Open width	Extensible Kraft	EK
		Low stretch Crepe Kraft	LSCK
		Wet strength Qualities	Prefixed WS
		Bitumen Laminates	Prefixed BU
		Polyethene Coatings	Prefixed PLC

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Durban
4000

Enquiries T.J. Grobler
☎ 428-6102

TEST REPORT

No. 691/83443/L401

Date 1994-11-25

This report relates only to the specific sample(s) tested as identified herein. It does not imply SABS approval of the quality and/or performance of item(s) in question and the test results do not apply to any similar item that has not been tested. (Refer also to the complete conditions printed on the back of the official test reports.)

1. DESCRIPTION OF PACKAGING DESIGN TYPE TESTED

See specification form attached as Appendix A.

Sample Numbers and Masses

Sample No.	Mass filled (kg)	Mass empty (kg)
1 2 3 4 5 6 7 8	17	-

Contents: Inner packagings, detailed in Appendix A, filled with matches

2. TESTS PERFORMED AND RESULTS

Test method: drop and stacking tests to paragraphs 9.7.3 and 9.7.6 of the Recommendations prepared by the United Nations Committee of Experts on the Transport of Dangerous Goods, as revised December 1990.

The methods of sample preparation and testing are detailed in the Operational Instructions for Test Stations, Appendices

Drop Test Results (paragraph 9.7.3)

Sample No.	Drop Ht(m)	Drop Attitude	Results
1	0,8	Flat on base	Pass
1	0,8	Flat on top	Pass
1	0,8	Flat on long side	Pass
1	0,8	Flat on short side	Pass
1	0,8	Diagonally on one corner	Pass

South African Bureau of Standards **Suid-Afrikaanse Buro vir Standaarde**

REPORT No. 691/83443/L401
VERSLAG

Stacking Test Results (paragraph 9.7.6)

Sample numbers	: 1
Required load	: 17 kg per sample, equivalent to a 3m stack
Applied load	: 221 kg
Contents	: Actual commodity
Conditions	: 23 ± 2°C, 50 ± 2% r.h.
Results	: Pass

3. CONCLUSIONS

Samples of the packaging design type were tested in accordance with paragraphs 9.7.3 and 9.7.6 of the Recommendations prepared by the United Nations Committee of Experts on the Transport of Dangerous Goods, as revised December 1990.

They were tested for Group III, gross mass not exceeding 17 kg.

The samples passed the tests and the packaging design type is considered to meet the performance requirements.

NOTE:
This design type will only be allowed for National distribution and is subject to the approval of the regulatory authorities.

TJ Grobler
PACKAGING DIVISION
for PRESIDENT

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SOUTH AFRICAN BUREAU OF STANDARDS

SABS SPP12 5/92

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

SPECIFICATION OF PACKAGING

PAPER BAGS (BALE PACK)

UN Code 5M1

Appendix A L401

Manufacturers Name & Address	
Style	Open mouth: Yes Gusseted: N/A Pasted/Seam: Yes Valved: N/A Non-gusseted: Yes

Dimensions in millimetres	Length + A	Face width + B	Gusset o C	Bottom width + D	Valve width + E
Nominal					
Actual including finish	945	410	-	-	-

	Ply 1 (outer)	Ply 2	Ply 3	Ply 4	Ply 5	Ply 6	Liner
Type of material	K	PLC					
Grammage (g/m²)	140	140					
Coating mass (g/m²)	-	-					

Valve	N/A
Closure	Base: Cold PVA adhesive (Rectangular closing method) Top: Cold PVA adhesive (Rectangular closing method)
Sewing	Type of stitch Stitches per 100 mm Type of thread N/A Min. breaking load (Newtons) N/A Filter cord
Adhesive	Cold PVA adhesive
Remarks	200 x paper wrapped unit packs of 10 x solid fibreboard boxes of matches, each unit pad wrapped in 52 per g/m² machine glazed paper of 100% recycled fibre. Packing pattern: 4 layers of 10 x 5 unit packs.

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